Climate Change and Human Health Literature Portal



Surveillance of vector populations and malaria transmission during the 2009/10 El Nino event in the western Kenya highlands: Opportunities for early detection of malaria hyper-transmission

Author(s): Ototo EN, Githeko AK, Wanjala CL, Scott TW

Year: 2011

Journal: Parasites & Vectors. 4: 144

Abstract:

BACKGROUND: Vector control in the highlands of western Kenya has resulted in a significant reduction of malaria transmission and a change in the vectorial system. Climate variability as a result of events such as El Nino increases the highlands suitability for malaria transmission. Surveillance and monitoring is an important component of early transmission risk identification and management. However, below certain disease transmission thresholds, traditional tools for surveillance such as entomological inoculation rates may become insensitive. A rapid diagnostic kit comprising Plasmodium falciparum circumsporozoite surface protein and merozoite surface protein antibodies in humans was tested for early detection of transmission surges in the western Kenya highlands during an El Nino event (October 2009-February 2010). METHODS: Indoor resting female adult malaria vectors were collected in western Kenya highlands in four selected villages categorized into two valley systems, the U-shaped (Iguhu and Emutete) and the V-shaped valleys (Marani and Fort Ternan) for eight months. Members of the Anopheles gambiae complex were identified by PCR. Blood samples were collected from children 6-15 years old and exposure to malaria was tested using a circum-sporozoite protein and merozoite surface protein immunchromatographic rapid diagnostic test kit. Sporozoite ELISA was conducted to detect circum-sporozoite protein, later used for estimation of entomological inoculation rates. RESULTS: Among the four villages studied, an upsurge in antibody levels was first observed in October 2009. Plasmodium falciparum sporozoites were then first observed in December 2009 at Iguhu village and February 2010 at Emutete. Despite the upsurge in Marani and Fort Ternan no sporozoites were detected throughout the eight month study period. The antibody-based assay had much earlier transmission detection ability than the sporozoite-based assay. The proportion of An. arabiensis among An. gambiae s.l. ranged from 2.9-66.7% indicating a rearrangement of the sibling species of the An. gambiae s.l complex. This is possibly an adaptation to insecticide interventions and climate change. CONCLUSION: The changing malaria transmission rates in the western Kenya highlands will lead to more unstable transmission, decreased immunity and a high vulnerability to epidemics unless surveillance tools are improved and effective vector control is sustained.

Source: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3148556

Resource Description

Early Warning System: M

resource focus on systems used to warn populations of high temperatures, extreme weather, or other elements of climate change to prevent harm to health

Climate Change and Human Health Literature Portal

A focus of content

Exposure: M

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Precipitation, Temperature

Temperature: Fluctuations

Geographic Feature: M

resource focuses on specific type of geography

Valley, Other Geographical Feature

Other Geographical Feature: highlands

Geographic Location: M

resource focuses on specific location

Non-United States

Non-United States: Africa

African Region/Country: African Country

Other African Country: Kenya

Health Impact: M

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Vectorborne Disease

Vectorborne Disease: Mosquito-borne Disease

Mosquito-borne Disease: Malaria

mitigation or adaptation strategy is a focus of resource

Adaptation

Population of Concern: A focus of content

Population of Concern: M

populations at particular risk or vulnerability to climate change impacts

Children

Resource Type: **™**

format or standard characteristic of resource

Research Article

V

Climate Change and Human Health Literature Portal

Resilience: M

capacity of an individual, community, or institution to dynamically and effectively respond or adapt to shifting climate impact circumstances while continuing to function

A focus of content

Timescale: M

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment: M

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content